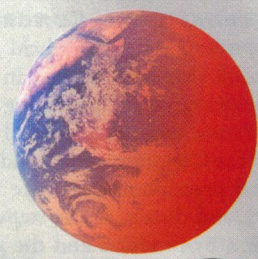
Rays of Hope in the Land of the Rising Sun



Joseph Tart

In 1970, French author Robert Guillain viewed with dismay "a dark ring of tall, smoking chimneys" creeping toward the shoreline across from one of the most famous sites in Japan: Miyajima, a sacred island bearing a shrine that at high tide seems to float on the sea. At the time, however, smokestack emissions were considered no threat. Quite the opposite: seven-colored smoke was viewed as an omen of prosperity. Now the third largest economy in the world, this ancient nation paid the same price as nearly every other industrialized country for its hasty entry into the era of manufacturing and consumerism. For a time, the air of its cities was choked with smog. A heavy aerial suspension of sulfur dioxide led to increased death rates from asthma and bronchitis. Water pollutants poisoned thousands. Japanese officials and official histories blame not only hasty development, but the structure and population of the country for environmental degradation and health problems. Eighty percent of Japan's population of 124 million people lives on 25% of the land area of this mountainous archipelago, where they must share the space with industry. Unchecked, this density of population, traffic, and economic activity has quickly overwhelmed this small country. Japan is finding that human health and industrial prosperity can co-exist, but the price is eternal vigilance and continual engineering.

Now the nation has some of the strictest pollution controls in the world. The worst of the air pollution has cleared, and the water is largely safe. Yet, prosperity continues to create new problems. More and more cars clog the roadways, overwhelming the pollution measures instituted in the 1970s. The water is safe for drinking and agricultural use, but the ecology of Japan's waterways is not always in the proper balance to support indigenous wildlife. Factories continue to emit greenhouse gases that contribute to global warming.

With this in mind, the nation's unique government–industry leadership is tailoring new plans to deal with emerging problems. Previously isolationist, Japan is now participating more in global pollution control efforts; always commercially minded, it wishes to supply the world not only with Walkmans, but with air pollution control technology.

Although Japan and the West seem to be largely on a common course now in environmental efforts, the origins of the Japanese environmental movement are unique. Unlike the United States, where the environmental movement was largely linked to the preservation and protection of nature, in Japan the movement was health driven.

Reuters/Bettman

Portent of pollution? Seven-colored smoke near the shrine at Miyajima was once considered an omen of prosperity.

Class Action

Industry exploded during the post-World War II recovery with the goal of transforming Japan from a feudal, agrarian society into a modern, middle-class export power. The Environment Agency reminisced in its official history, " . . . almost every kind of environmental pollution and destruction of nature could be observed in this small country, Japan. Deterioration of environmental conditions and destruction of the environment was considered to be inevitable, or even regarded as some sort of necessary evil consequent upon expansion of production."

The extent to which production would cause harm was not anticipated, however. The Japanese, said Miwako Kurosaka, senior associate at the World Resources Institute in Tokyo, had "introduced Western technology without deep consideration of what that meant. Technology is like a knife; if you don't know how to use it, it can be destructive."

Unwilling to pay the price, angry fishermen in 1958 broke into a paper factory in Tokyo that had polluted fisheries, inaugurating an era of social protest that would last into the early 1970s. As a result of the fishermen's actions, two laws designed to limit industrial water pollution and conserve water quality were instituted. These laws, however, covered only limited areas and substances and were not adequately followed, according to Hideshi Kurasaka, former chief of the Environment Agency's Planning Section and now a researcher at the University of Maryland.

In the 1960s, citizens began to show symptoms of exposure to air pollution and heavy metal contamination. Coughing, watery eyes, and a worsening of respiratory diseases were observed. A small number of men were seen by physicians near the city of Minamata exhibiting stupor, confusion, difficulty writing or using chopsticks, and other symptoms. These men were found to have brain damage from eating methylmercury-contaminated fish, and their particular syndrome became known as Minamata disease. Some citizens visited the industries which had dumped mercury into the local waters to seek redress, and were "completely ignored," said Miranda Schreurs, an environment specialist and assistant professor in the University of Maryland Department of Government and Politics. The syndrome eventually affected between 2,000 and 3,000 people and included effects such as birth defects and even deaths.

In 1967, 12 asthma victims living in Yokkaichi sued companies in the area's petrochemical complex for health effects allegedly caused by sulfur dioxide emis-

sions. A court ruled that the companies had been negligent in siting and operating the complex and for failing to use the best available technology to control emissions. Three other suits were filed by victims of Minamata disease, caused by mercury-contaminated water, and victims of itai-itai, a disease caused by waterborne cadmium that resulted in symptoms such as nausea, vomiting, diarrhea, and in some cases, kidney dysfunction. Together, the afflictions were called kogai-byo—diseases caused by pollution—and the legal actions became known as the Four Big Kogai Lawsuits. The industries whose emissions had caused the new diseases were heavily fined.

Families of the victims of Minamata disease also brought lawsuits against the factory manager and president of the company responsible, according to Shigeyuki Okajima, an environmental journalist and deputy director of the commentary department at *Yomiuri Shimbun*, a prominent Japanese newspaper. Victims also sought redress from the government for failing to stop the dumping, but were unsuccessful.

During this era and into the 1970s, the United States passed national pollution control laws and established the Environmental Protection Agency. Japan, taking its cues from the West, began its own internal reforms. The Pollution-related Health Damage Compensation Law was enacted, establishing a polluter-financed, nationwide compensation fund for victims of designated air and water pollution-related diseases, such as Minamata disease, itai-itai, chronic bronchitis, and asthma. Victims who lived for a specified amount of time in a designated pollution area became eligible for health and welfare compensation under the law.

In 1967, the Basic Law for Environmental Pollution Control was established to regulate air, water, and soil pollution. Japan established its Environment Agency in 1971, which quickly became responsible for formulating and setting emission standards. The National Institute for Environmental Studies was established in 1972 in the newly created Tsukuba City Science Park. In 1980, the cabinet issued an order requiring environmental impact statements to be filed for large public projects. The edict on impact statements is meant to serve as a guideline only, said Schreurs, and environmental quality standards are considered to be goals rather than requirements.

Yet, these goals are usually met through a combination of negotiation and the top-down style of the nation's government–industry partnership. The emission standards, for instance, spurred the Ministry of International Trade and Industry (MITI) to research and develop desulfurization technology and prompted a switch from high-sulfur to low-sulfur fuels. As a result, Japan became a world leader in manufacture of desulfurization and denitrification filters for industrial smokestack emissions, Schreurs said. With the Arab oil embargo, Japan began to rely more on nuclear power. Now, some 30% of the nation's electricity is supplied by nuclear power plants.

World Resources Institute-Tokyo

Miwako Kurosaka—Technology can be destructive if misused.

According to Mitsusune Yamaguchi, secretary of the Global Environmental Conservation Promotion Committee of the Tokyo Marine and Fire Insurance Company, Ltd., who spoke at the U.S.–Japan environmental conference sponsored by the University of Maryland in December, MITI met with each of the 87 business groups in its charge and showed them a plan to help make their activities more environment friendly. Each group was told to "voluntarily" (Yamaguchi's quotes) submit its own plan for compliance.

Many cities have instituted regulations that are stricter than national standards, Schreurs said. Lacking the international clout of MITI, local governments and citizens find they are able to enforce compliance the old-fashioned way: they may threaten a product boycott or suggest a certain permit be withheld unless standards are met, Schreurs said.

Difficulties in achieving goals in some areas remain. The Kyodo News Service reported last year that a central government survey found that many local governments had failed to identify soil and groundwater polluters in their areas. The localities blamed the failure on a lack of funds for enforcement. Although the Japanese business–government partnership is famous, companies have been known to conduct behind-the-scenes business arrangements to seek leeway in ambitious pollution-reduction timetables, according to Pat Murdo, Washington, DC spokesperson for the Japan Federation of Economic Organizations, known as the "Keidanren," which represents 1,000 leading Japanese businesses. "It's a normal situation," Murdo said. "They're not angels on either side."

With environmental safeguarding now a fact of life, the cost of compliance with regulations is built in when new construction begins. Japan ranks among the Organization for Economic Cooperation and Development (OECD) member countries that invest the most in pollution abatement and control, about 1.6% of gross domestic product. "In Japan, when a new factory is constructed at a cost of 100 billion [yen], anti-pollution devices account for some 30 billion," said Shigeyuki Okajima, vice chief of the commentary section for *Yomiuri Shimbun*.

Air Pollution

Japan faced unprecedented air pollution in the early 1970s. News photos sometimes showed Tokyo traffic police wearing

Reuters/Bettman

Minamata's legacy. Victims of mercury poisoning protested in front of the Environment Agency in 1992 when a district court cleared the agency of responsibility for the disease 40 years after it was first detected.

breathing masks, and small epidemics of chest discomfort, muscle spasms, and eye irritation among schoolchildren were reported. Around the same time, deaths from asthma and chronic bronchitis increased, according to a retrospective study from Mie University in Tsu.

Japan's establishment of sulfur oxide and nitrogen oxide emission standards, considered among the strictest in the world, led to dissipation of the famous "Tokyo smog," along with the air pollution in other cities. Through the introduction of low-sulfur fuel, development and use of desulfurization processes and installation of technology to filter smokestack gases, sulfur and nitrogen oxide emissions have been drastically reduced.

Reuters/Bettman

Fine kettle of fish? Past contamination of Japan's fishing and agricultural water continues to cause health problems.

"Japanese pollution problems peaked in 1972 and began to abate after 1980," Syouzou Azuma of Japan's House of Representatives reported during the Second U.S.–Japan Seminar on the Global Environment, sponsored by the Johns Hopkins Foreign Policy Institute and the Japan Institute of International Affairs in 1993. Now, Japan produces less air pollution than any other industrialized nation, according to Curtis Moore and Alan Miller, authors of *Green Gold: Japan, Germany, and the United States and the Race for Environmental Technology.*

Researchers continue to study the effects of sulfur dioxide inhalation. A study at Mie University found that although mortality from asthma and bronchitis increased during peak pollution years, it decreased as anti-emission measures reduced sulfur dioxide content of air.

Sulfur dioxide in Japan's air decreased by 82% over the past two decades, according to OECD. As of 1989, Japanese utilities emit only one-eighteenth the sulfer dioxide per kilowatt/hour of the average of the United States, Germany, France and Canada, according to the Tokyo Electric Power Company. Japan's sulfur dioxide emissions from mobile sources was about 20% of those in the United States, according to OECD figures from 1989.

Nitrogen oxides are another story. The nitrogen oxide burden in air dropped by only 21% over 20 years of emission controls, and while the OECD found this the best among its members, Japan still considers it a problem. "This is primarily due to a rapid increase in motorization," said Kurasaka. "The number of automobiles owned in 1990 is three times that in 1971. We can't stop the traffic, so we have to solve the problem by other methods," he said.

One such method is the 1992 law on special measures concerning reducing total nitrogen oxide emissions from vehicles within special designated zones. Under this law, residents in a designated zone are not permitted to use a vehicle that does not meet the standard on nitrogen oxide emissions. Another solution may be to create bus routes, or even covering main roads and scrubbing emissions clean of noxious gases. When engineers get together, they describe this approach as the "tunnel scrubber," Kurasaka said.

The health effects of nitrogen oxides have been difficult to sort out; however, one study speculated the gases may change the structure of lung proteins. "At high concentrations, it causes more coughing, more phlegm," Kurasaka said. "This is not sickness, but it is not healthy." What is uncomfortable irritation for most people may be a factor that can worsen asthma.

Another problem is continued emission of industrial carbon dioxide, a major greenhouse gas that contributes to suspected global warming. Japan emits 4% of the world's total industrially produced carbon dioxide and one-fifth of that of the United States, but aims to lower that figure even further. Reported schemes include bubbling the gas from industrial processes through beds of algae, which would consume the gas and convert it to carbohydrate.

A pledge to hold carbon dioxide emissions to 1990 levels by 2000 received much publicity in recent years, but there is still discussion about what it means. According to Murdo, industry wanted a much longer time line but then settled for the insertion of the term "per capita" in the reduction clause. Regulating emissions on a per capita basis would still permit an increase, Murdo said. The reduction is on construction of new nuclear power plants, as well as promotion of energy conservation and wider use of renewable energy.

Water Pollution

Industrial discharge of heavy metals into fishing and agricultural water—such as that used to irrigate rice paddies—has largely ceased, but research into past contamination and its ongoing effects continues.

Studies conducted by Nagasaki University School of Medicine and Kanazawa Medical University found that dietary cadmium causes progressive and irreversible kidney damage and that mortality rates from this damage increase in proportion to exposure to cadmium, compared to the general population. Renal dysfunction may even progress after exposure to cadmium has ended, another study at Kanazawa Medical University showed. Meanwhile, researchers at Argonne National Laboratory in Illinois said their research supported Japanese studies that suggest cadmium exposure enhances bone loss in post-menopausal women.

Japan now has two standards for water quality enforcement. One set governs emissions that might affect human health, the other deals with ecological issues crucial to the support of wildlife and the natural environment. Standards "on pollutants toxic to human health have been achieved," Kurasaka said. These standards regulate emission into water of 22 substances including cadmium, cyanide, lead and other heavy metals, and PCBs.

"For water quality associated with the living environment, however, the rate of achieving standards has been low, especially in enclosed water areas, such as lakes and reservoirs, bays, and inland seas," Kurasaka said. Recently, for instance, runoff of fertilizers and untreated residential water into lakes caused an overgrowth of algae, which cut off oxygen to fish and caused their death.

Acid Rain

Reports of acid rain were becoming common in the news during the early 1970s. After two days of precipitation during the summer of 1974, 4,000 Tokyo residents reported teariness and eye irritation—injuries apparently related to exposure to acid rain—to the Tokyo Hygiene Bureau.

The incident and other similar reports made the news, but these stories disappeared from the press in 1975, said Schreurs. Around this time, factory emission controls began to reduce the release of pollutants that contributed to acid rain in Japan. Mysteriously, however, the problem continued.

It was not until the 1980s, with Europe's concern over trans-border acid rain, that Japan began to worry that the same thing might be happening on its mountainous islands. Minor damage to trees and lakes led to fears of worse effects. Although Japan's soil is highly alkaline and therefore has managed to neutralize many of the effects of acid rain, there are doubts about how long this effect can last.

Japan is pointing the finger of blame at China, one of the biggest coal-burners in the world, and at South Korea. According to a six-year study sponsored by Japan's power companies, South Korea is responsible for 15% of the acid rain in Japan and China is responsible for one-half. Japan is trying to export sulfur scrubbers to China, while working with the United States to coax China to adopt more efficient energy technologies.

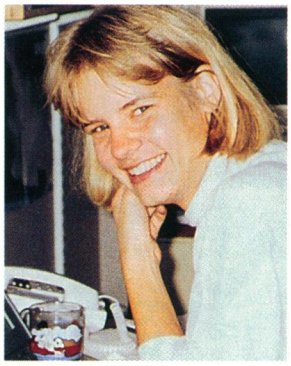
Cancer Rates

As in many industrialized countries, there is concern about the relationship between cancer rates and environmental factors. In Japan, cancer has been the number one cause of death since the mid-1980s, replacing stroke, which led the list for the three previous decades, according to Seiya Yamaguchi, president of the Environmental and Occupational Health Institute, a private consulting organization.

Stomach cancer is still the most frequent cause of cancer death among Japanese living in Japan, but its incidence is declining. Although the traditional diet containing pickled and highly salted foods is considered to be a factor, the role of genetics and *Heliobacter pylori* bacteria is also under investigation. Some studies have shown a link between higher rates of gastric cancer and the presence of *H. pylori*-related chronic gastritis.

The incidence of lung cancer is increasing, and polluting substances in the air are suspected of playing a role, but the Japanese also have a tobacco habit. Results of a recent study by Yamaguchi which broke down smoking by occupation showed that 48% of all Japanese office workers were smokers and 51.5% of agricultural workers smoke. The Centers for Disease Control in the United States estimates that 25% of U.S. adults smoke. Smoking has also become more popular among young Japanese women. In 1970, 9.8% of women aged 20–29 smoked; in 1990, the figure had risen to 20.2%.

Whereas breast cancer is the second leading cause of cancer mortality in the United States behind lung cancer, breast cancer rates are relatively low in Japan. The reasons are under investigation, but may include diet. The Japanese diet is high in phytoestrogens, substances found in food that animal studies and epidemiological studies suggest have an anticancer effect. Tofu, green tea, and other staples of the Japanese daily menu contain substantial levels of phytoestrogens.



U. of Maryland

Miranda Schreurs—Public access to environmental information is limited in Japan, but this may be changing.

Workers exposed to arsenic in copper and gold smelting factories, as well as people living close to these operations, have increased rates of lung and skin cancer, said Yamaguchi, but a causal relationship has not been established.

"Occupational and work-related diseases have been found in 1991 to be around three percent of total workers in Japan," Yamaguchi said. "However, the incidence of disease has gradually changed from substance-related poisoning and/or injuries to psychological disorders caused by several kinds of stress and social, familial anxiety." The Ministry of Labor has instituted preventive measures, such as the Total Health Promotion Plan, which makes it an employer's responsiblity to provide stress-reduction opportunities such as sports facilities.

International Cooperation

Since the 1970s, Japan has entered into a number of agreements with the United States to provide for cooperation in scientific research and policy development, many of which address issues of environmental health.

Two of the main policies shared by these two governments are the Agreement on Cooperation in Environmental Protection and Development Related to Innovative Environmental Technology. In addition, under the U.S.–Japan Cooperative Medical Sciences Program, a panel of U.S. and Japanese scientists meet annually to address the issue of environmental carcinogens. Nine other panels meet under this program to discuss other areas of health such as infectious disease. David Strother, Japan program manager with the U.S. EPA's Department of International Activities, says that programs such as these provide impetus for research and policy development. Said Strother, "Once a year, people have got to wake up and say 'What have I done? What do I need to do?'"

Many Japanese scientists conduct pre- and post-doctoral training in the United States under programs administered by the National Insititutes of Health's Fogarty International Center.

Risk Assessment

A realization of Japan's scientific establishment has been that Japan so far lacks a mechanism by which to measure the dangers that polluting substances pose to both population and nature. Rather than conducting risk assessment science, government and industry simply responded to health concerns. Now, he said, the nation's

WHO/UN PHOTO

The people press. Japan's rapid population growth exacerbates existing environmental problems.

Reuters/Bettman

New voices. Japanese environmental activists protest against the arrival of 1.7 tons of plutonium to the Tokai nuclear power plant northeast of Tokyo.

leadership would like to branch out, and it is beginning to rely on research conducted in the West, including the United States, to assess Japan's risk from substances such as dioxin and airborne mercury. "We want to broaden and cover more substances," Kurasaka said.

The media has kept the public informed of environmental risks since the 1960s, but now the government produces a steady stream of reports and position papers that receive attention even outside Japan. Although Japanese officials may seem open about some of the remaining pollution problems in their country, researchers point out that the government decides how much scientific information will be released to the public about any given risk. "Japan is a far more closed society than the United States when it comes to information," Schreurs says. "There is no Freedom of Information Act, so right there the public's access to information is limited." The public, Schreurs said, is largely acquiescent in this arrangement, but there are signs this is changing. A survey conducted by the Japan Center for a Sustainable Environment and Society following the 1993 Earth Summit in Brazil indicated that environmental awareness among Japanese was increasing. Environmental education ranked at the top of a list of priorities presented to survey respondents.

The Future

For the next century, Japan has two main environmental goals: domestic peace of mind for future generations and leadership in the international sphere, said Prime Minister Tomiichi Murayama upon acceptance of an environmental plan.

Based on passage of the basic environmental law in 1993, the Japanese cabinet in December adopted a plan that "incorporates the concepts of recycling, co-existing with nature and the participation of all groups in the nation to protect the environment," the Kyodo News Service and others reported. Under the law, governors of severely polluted prefectures are developing environmental projects to be approved by the prime minister. At least 150 programs for 39 areas had been approved by mid-winter, Kurasaka said.

Industry, through the Research Institute for the Earth, a government–industry organization sponsored by MITI, is searching for technologies to remove or recycle contaminants such as carbon dioxide, while MITI itself is pushing for investment in ways to boost energy efficiency.

Also under discussion are ways to clean up land contaminated by runoff from toxic disposal areas. The government instituted measures to govern dumping and protect farmland, but hasn't come to any conclusions about past toxic waste that may be trickling into residential areas. "This hasn't caused any problems yet, but it may have the potential one day to cause problems the way Love Canal did in the United States" unless new regulations are instituted, Kurasaka said.

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Hideshi Kurasaka—Japan has achieved much of its goals for human health standards.

Under discussion is a Superfund-like measure. Last fall, the government also announced a fresh set of directives to prevent trichloroethylene—widely used by dry cleaners and semiconductor makers—and other widely dumped, cancer-causing agents from further seeping into soil and groundwater. A 1988 survey of 10,000 wells found that trichloroethylene contamination exceeded acceptable limits in 222 wells. The chemical is regulated under the 1989 water pollution control law, but seepage continues in some areas.

Japan's participation in global activism is increasing. In April 1990, MITI announced its plans for New Earth 21: Action Program for the 21st Century, which calls for international cooperation in establishing a 100-year plan for environmental clean-up after 200 years of pollution caused by the industrial revolution. Prior to meeting with U.S. EPA Administrator Carol Browner in November 1994, Sohei Miyashita, Japan's Environment Agency director general, said the United States and Japan "are in a position to lead the world's environment policy."

Japan's nongovernmental organizations, which tend toward nature appreciation, tend to be smaller and quieter than U.S. environmental groups. A few, however, are activist such as the Nature Conservation Society of Japan, which opposes construction of an airport that would endanger wildlife on Anajima Island and, in cooperation with the World Wildlife Fund, composed the "Red Data Book" leading to passage of laws to protect endangered species. "A matter of great urgency is promoting an increase of membership of nongovernmental organizations to support our activities," said Takuko Hasegawa, an NACS research officer.

Ironically, the industry that Japan exports—its factories in developing nations, particularly Asia—do not follow the sterling example of their homeland. *The New York Times*, *The Economist*, and others have assiduously reported incidents of heavy-metal poisoning among residents of communities around Jakarta Bay, Indonesia, site of many Japanese-operated factories, and severe air and water pollution near a copper smelter owned by a Japanese consortium. "We remain naïve when building factories in developing countries. It shames me to say that some Asian people remind us, 'Please do not make me another victim of Minamata,'" said Okajima.

Big companies are beginning to behave more responsibly, one reason being they can afford to. Smaller companies may take a while longer. Among all companies, however, awareness is growing. "Business people are more concerned about such criticisms," said Kurosaka. "Japanese business is realizing it cannot contribute to those things any more." Kurosaka continued, "All Japanese economic activities depend on resources of other countries. It means our image is more important than before. But it's more than image; it's survival. Japan must maintain good relations with these countries for survival."

Jan Ziegler

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